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Date of Application, 8th Dec., 1898

Complete Specification Left, 5th Sept., 1899—Accepted, 21st Oct., 1899

PROVISIONAL SPECIFICATION.

Improvements in the Manufacture of Cider for Retarding the Fermentation of the Apple Juice.

I, JOHN IMRAY, of Birkbeck Bank Chambers, Southampton Buildings, in the County of London, Consulting Engineer and Chartered Patent Agent, do hereby declare the nature of this invention (as communicated to me from abroad by La Société Anonyme des Matières Colorantes et Produits Chimiques de St. Denis, 5 Manufacturers, and Daniel August Rosenstiehl, Chemist, all of 105, Rue Lafayette, Paris, France,) to be as follows:—

Cider, like beer, is preferably consumed while in a state of fermentation.

Unfortunately, such fermentation is ordinarily completed in a few months, or even weeks, so that when the hot weather comes, at which time cider is most appreciated, it has generally lost its sparkling property and has become dead and dry.

The present invention has for its object to remedy this defect by increasing the duration of fermentation if necessary into the second year, and thereby preserving the agreeable qualities of the cider for a considerable time.

15 The fundamental fact on which this invention is based was observed by my correspondents when investigating the action of alcoholic yeast on sterilised apple must. An apple yeast taken from apple juice in full fermentation and distributed in sterilised apple juice, loses its activity to such an extent that the fermentation produced thereby is slow and incomplete. The weakening effect is such that it is easy to

20 obtain yeasts which still have the property of multiplying in apple juice, but have lost their property of producing fermentation. It is as though the apple juice contained a principle which is opposed to the fermentation.

Thus this property might be utilised in the manufacture of cider by distributing in sterilised apple juice a yeast which has been weakened by a certain number of

25 cultures. There is however, a still simpler way of operating, which consists in treating the sterilised must with a quantity of active yeast which is insufficient to effect a complete fermentation.

The splitting up of the sugar is then effected by a first generation of yeast. 30 The succeeding generations which are produced in the same liquor, being more and more weakened, lose their property of continuing the fermentation, and thus by a single impregnation the desired result is obtained.

Lastly, instead of operating upon a must which has been completely sterilised by several heatings, the sterilisation may be left incomplete by limiting the 35 process to a single heating. The active ferments having been thereby destroyed, there only remain yeast germs which, in this liquor which is unfavorable to their activity, can only produce a slow fermentation.

By adding to this apple juice at the moment required an active yeast, it can be brought to the degree of fermentation suitable for consumption.

40 The above described three methods of operating which enable a very slow fermentation of apple juice to be effected, render it easy to preserve the same

[Price 8d.]

Imray's Manufacture of Cider for Retarding the Fermentation of the Apple Juice.

in casks in a favorable condition. The cider, which is easily affected by the atmosphere, is thus protected against aerial microbes which may gain access thereto owing to defective closure of the receptacle.

The carbonic acid which is developed slowly but continuously protects it.

An idea may be formed of the slow degree of fermentation required for attaining the desired end, by bearing in mind the fact that the apple juice which forms the bulk of the trade only contains 100 grammes of sugar per litre. In order to make this quantity last one year it is necessary that the quantity of sugar fermented daily shall only be $\frac{100}{365} = 27.4$ grammes per hecto litre.

In reality, in the earlier days of the fermentation the progress is more rapid, and it decreases subsequently.

The above described process is carried out as follows:—

The apple juice is in the first instance saturated with carbonic acid, either by means of a preliminary fermentation, or by introducing carbonic acid from any source.

It is then heated to 50° C., causing it to pass through a heating apparatus similar to those employed for pasteurising wines. On issuing from this apparatus the must is led into a previously sterilised receptacle, which may either be a vat or a tank. The must may either be introduced at its temperature of 50° C., in which case, in order to prevent it from losing its fruity flavour by the action of the air, the recipient is previously filled with carbonic acid gas; or the heat of the must may be utilised by causing it to be given up to a fresh quantity of cold juice, as is done in apparatus for pasteurising wine.

The receptacles, when filled with must, are hermetically closed with the exception of a small opening for the escape of carbonic acid, and suitable chemical apparatus are provided for following on with a supply of carbonic acid after the fermentation has been active.

If necessary, the heating may be repeated two or three times.

After the must has cooled it is either charged, or not, with a selected yeast, according to the requirements of the manufacture. By using measured quantities of the ferment, the rapidity of the fermentation can be readily controlled, and it can be prolonged without the addition of sugar considerably beyond the limits possible with the ordinary process of cider manufacture.

Dated this 8th day of December 1898.

ABEL & IMRAY,
Agents for the Applicant.

COMPLETE SPECIFICATION.

Improvements in the Manufacture of Cider for Retarding the Fermentation of the Apple Juice.

I, JOHN IMRAY, of Birkbeck Bank Chambers, Southampton Buildings, in the County of London, Consulting Engineer and Chartered Patent Agent, do hereby declare the nature of this invention (as communicated to me from abroad by La Société Anonyme des Matières Colorantes et Produits Chimiques de St. Denis, Manufacturers, and Daniel August Rosenstiehl, Chemist, all of 105, Rue Lafayette, Paris, France) and in what manner the same is to be performed to particularly described and ascertained in and by the following statement:—

Cider, like beer, is preferably consumed while in a state of fermentation.

Unfortunately, such fermentation is ordinarily completed in a few months, or even weeks, so that when the hot weather comes, at which time cider is most

Imray's Manufacture of Cider for Retarding the Fermentation of the Apple Juice.

appreciated, it has generally lost its sparkling property and has become dead and dry.

The present invention has for its object to remedy this defect by increasing the duration of fermentation if necessary into the second year, and thereby preserving the agreeable qualities of the cider for a considerable time.

The fundamental fact on which this invention is based was observed by my correspondents when investigating the action of alcoholic yeast on sterilised apple must. An apple yeast taken from apple juice in full fermentation and distributed in sterilised apple juice, loses its activity to such an extent that the fermentation produced thereby is slow and incomplete. The weakening effect is such that it is easy to obtain yeasts which still have the property of multiplying in apple juice, but have lost their property of producing fermentation. It is as though the apple juice contained a principle which is opposed to the fermentation.

Thus this property might be utilised in the manufacture of cider by distributing in sterilised apple juice a yeast which has been weakened by a certain number of cultures.

There is however, a still simpler way of operating, which consists in treating the sterilised must with a quantity of active yeast which is insufficient to effect a complete fermentation.

The splitting up of the sugar is then effected by a first generation of yeast. The succeeding generations which are produced in the same liquor, being more and more weakened, lose their property of continuing the fermentation, and thus by a single impregnation the desired result is obtained.

Lastly, instead of operating upon a must which has been completely sterilised by several heatings, the sterilisation may be left incomplete by limiting the process to a single heating. The active ferments having been thereby destroyed, there only remain yeast germs which, in this liquor which is unfavorable to their activity, can only produce a slow fermentation.

By adding to this apple juice at the moment required an active yeast, it can be brought to the degree of fermentation suitable for consumption.

The above described three methods of operating which enable a very slow fermentation of apple juice to be effected, render it easy to preserve the same in casks in a favorable condition. The cider, which is easily affected by the atmosphere, is thus protected against aerial microbes which may gain access thereto owing to defective closure of the receptacle.

The carbonic acid which is developed slowly but continuously protects it.

An idea may be formed of the slow degree of fermentation required for attaining the desired end, by bearing in mind the fact that the apple juice which forms the bulk of the trade only contains 100 grammes of sugar per litre. In order to make this quantity last one year it is necessary that the quantity of sugar fermented daily shall only be $\frac{100 \times 365}{365} = 27.4$ grammes per hecto litre.

In reality, in the earlier days of the fermentation the progress is more rapid, and it decreases subsequently.

The above described process is carried out as follows:—

The apple juice is in the first instance saturated with carbonic acid, either by means of a preliminary fermentation, or by introducing carbonic acid from any source.

It is then heated to 50° C., causing it to pass through a heating apparatus similar to those employed for pasteurising wines. On issuing from this apparatus the must is led into a previously sterilised receptacle, which may either be a vat or a tank. The must may either be introduced at its temperature of 50° C., in which case, in order to prevent it from losing its fruity flavour by the action of the air, the recipient is previously filled with carbonic acid gas; or the heat of the must may be utilised by causing it to be given up to a fresh quantity of cold juice, as is done in apparatus for pasteurising wine.

The receptacles, when filled with must, are hermetically closed with the exception of a small opening for the escape of carbonic acid, and suitable chemical

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apparatus are provided for following on with a supply of carbonic acid after the fermentation has been active.

If necessary, the heating may be repeated two or three times.

After the must has cooled it is either charged, or not, with a selected yeast, according to the requirements of the manufacture. By using measured quantities of the ferment, the rapidity of the fermentation can be readily controlled, and it can be prolonged without the addition of sugar considerably beyond the limits possible with the ordinary process of cider manufacture. 5

Having thus particularly described and ascertained the nature of this invention and in what manner the same is to be performed, I declare that what I claim is:— 10

1. In the manufacture of cider, producing a slow fermentation by first sterilising the apple juice and then fermenting it with an enfeebled yeast, substantially as described.

2. In the manufacture of cider, producing a slow fermentation by first sterilising the apple juice and then fermenting it with an active yeast added in proportion insufficient to effect complete fermentation, substantially as described. 15

3. In the manufacture of cider, producing a slow fermentation by first incompletely sterilising the apple juice and then fermenting it with the yeast which it still contains, or with an enfeebled yeast, or with an active yeast added in proportion insufficient to effect complete fermentation, substantially as described. 20

Dated this 31st day of August 1899.

ABEL & IMRAY,
Agents for the Applicant.